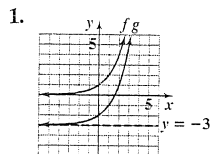


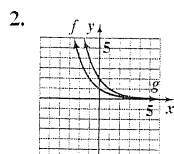
Mid-Chapter 3 Check Point



$$f(x) = 2^x$$

$$g(x) = 2^x - 3$$

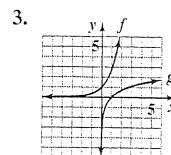
asymptote of f : $y = 0$;
 asymptote of g : $y = -3$;
 Domain of f = Domain of g = $(-\infty, \infty)$;
 Range of f = $(0, \infty)$; Range of g = $(-3, \infty)$



$$f(x) = \left(\frac{1}{2}\right)^x$$

$$g(x) = \left(\frac{1}{2}\right)^{x-1}$$

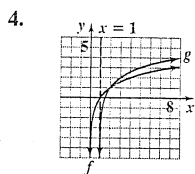
asymptote of f : $y = 0$;
 asymptote of g : $y = 0$;
 Domain of f = Domain of g = $(-\infty, \infty)$;
 Range of f = Range of g = $(0, \infty)$



$$f(x) = e^x$$

$$g(x) = \ln x$$

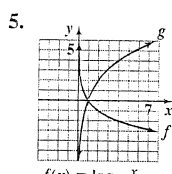
asymptote of f : $y = 0$;
 asymptote of g : $x = 0$;
 Domain of f = Range of g = $(-\infty, \infty)$;
 Range of f = Domain of g = $(0, \infty)$



$$f(x) = \log_2 x$$

$$g(x) = \log_2(x-1) + 1$$

asymptote of f : $x = 0$;
 asymptote of g : $x = 1$;
 Domain of f = $(0, \infty)$; Domain of g = $(1, \infty)$;
 Range of f = Range of g = $(-\infty, \infty)$



$$f(x) = \log_{1/2} x$$

$$g(x) = -2 \log_{1/2} x$$

asymptote of f : $x = 0$;
 asymptote of g : $x = 0$;
 Domain of f = Domain of g = $(0, \infty)$;
 Range of f = Range of g = $(-\infty, \infty)$

6. $(-6, \infty)$ 7. $(0, \infty)$ 8. $(-\infty, -6) \cup (-6, \infty)$ 9. $(-\infty, \infty)$ 10. 5 11. -2 12. $\frac{1}{2}$ 13. $\frac{1}{3}$ 14. 2
 15. Evaluation not possible; $\log_2 \frac{1}{8} = -3$ and $\log_3(-3)$ is undefined. 16. 5 17. $\sqrt{7}$ 18. 13 19. $-\frac{1}{2}$ 20. $\sqrt{\pi}$
 21. $\frac{1}{2} \log x + \frac{1}{2} \log y - 3$ 22. $19 + 20 \ln x$ 23. $\log_7 \left(\frac{x^8}{\sqrt[3]{y}} \right)$ 24. $\log_5 x^9$ 25. $\ln \left[\frac{\sqrt{x}}{v^3(z-2)} \right]$ 26. \$8

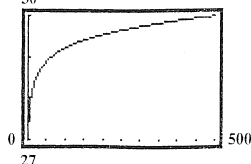
Section 3.4

Check Point Exercises

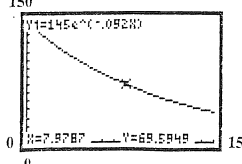
1. a. $\{3\}$ b. $\{-12\}$ 2. $\left\{ \frac{\ln 134}{\ln 5} \right\}; \approx 3.04$ 3. $\left\{ \frac{\ln 9}{2} \right\}; \approx 1.10$ 4. $\left\{ \frac{\ln 3 + \ln 7}{2 \ln 3 - \ln 7} \right\}; \approx 12.11$ 5. $\{0, \ln 7\}; \ln 7 \approx 1.95$
 6. a. $\{12\}$ b. $\left\{ \frac{e^2}{3} \right\}$ 7. $\{5\}$ 8. $\{4, 5\}$ 9. 0.01 10. 16.2 yr 11. 2014

Exercise Set 3.4

1. $\{6\}$ 3. $\{3\}$ 5. $\{3\}$ 7. $\{2\}$ 9. $\left\{ \frac{3}{5} \right\}$ 11. $\left\{ \frac{3}{2} \right\}$ 13. $\{4\}$ 15. $\{5\}$ 17. $\left\{ -\frac{1}{4} \right\}$ 19. $\{13\}$ 21. $\{-2\}$
 23. $\left\{ \frac{\ln 3.91}{\ln 10} \right\}; \approx 0.59$ 25. $\{\ln 5.7\}; \approx 1.74$ 27. $\left\{ \frac{\ln 17}{\ln 5} \right\}; \approx 1.76$ 29. $\left\{ \ln \frac{23}{5} \right\}; \approx 1.53$ 31. $\left\{ \frac{\ln 659}{5} \right\}; \approx 1.30$
 33. $\left\{ \frac{\ln 793 - 1}{-5} \right\}; \approx -1.14$ 35. $\left\{ \frac{\ln 10.478 + 3}{5} \right\}; \approx 2.45$ 37. $\left\{ \frac{\ln 410}{\ln 7} - 2 \right\}; \approx 1.09$ 39. $\left\{ \frac{\ln 813}{0.3 \ln 7} \right\}; \approx 11.48$
 41. $\left\{ \frac{3 \ln 5 + \ln 3}{\ln 3 - 2 \ln 5} \right\}; \approx -2.80$ 43. $\{0, \ln 2\}; \ln 2 \approx 0.69$ 45. $\left\{ \frac{\ln 3}{2} \right\}; \approx 0.55$ 47. $\{0\}$ 49. $\{81\}$ 51. $\{e^2\}; \approx 7.39$ 53. $\{59\}$
 55. $\left\{ \frac{109}{27} \right\}$ 57. $\left\{ \frac{62}{3} \right\}$ 59. $\left\{ \frac{e^4}{2} \right\}; \approx 27.30$ 61. $\{e^{-1/2}\}; \approx 0.61$ 63. $\{e^2 - 3\}; \approx 4.39$ 65. $\left\{ \frac{5}{4} \right\}$ 67. $\{6\}$ 69. $\{6\}$
 71. $\{5\}$ 73. $\{12\}$ 75. $\left\{ \frac{4}{3} \right\}$ 77. \emptyset 79. $\{5\}$ 81. $\left\{ \frac{2}{9} \right\}$ 83. $\{28\}$ 85. $\{2\}$ 87. \emptyset 89. $\left\{ \frac{11}{3} \right\}$ 91. $\left\{ \frac{1}{2} \right\}$
 93. $\{e^3, e^{-3}\}$ 95. $\left\{ \pm \sqrt{\frac{\ln 45}{\ln 3}} \right\}$ 97. $\left\{ \frac{5 + \sqrt{37}}{2} \right\}$ 99. $\{-2, 6\}$ 101. about 0.11 103. a. 18.9 million b. ≈ 2007
 105. 8.2 yr 107. 16.8% 109. 8.7 yr 111. 15.7% 113. a. quite well b. 2006 115. 2.8 days; Yes, the point $(2.8, 50)$ appears to lie on the graph of P . 117. $10^{-2.4}$; 0.004 moles per liter 123. $\{2\}$ 125. $\{4\}$ 127. $\{2\}$ 129. $\{-1.391606, 1.6855579\}$
 131. 30 133. 150



As distance from eye increases, barometric
 air pressure increases.



about 7.9 min